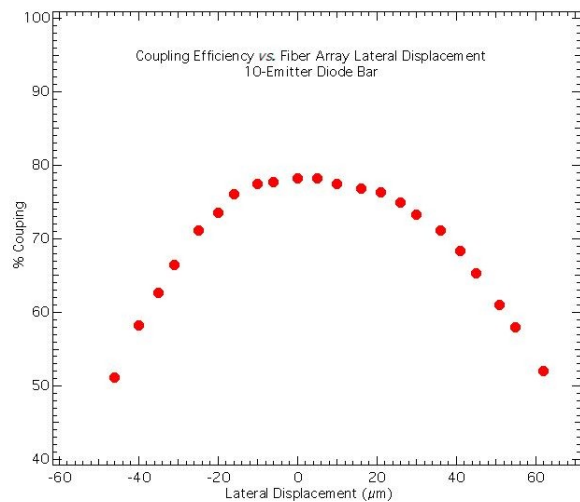
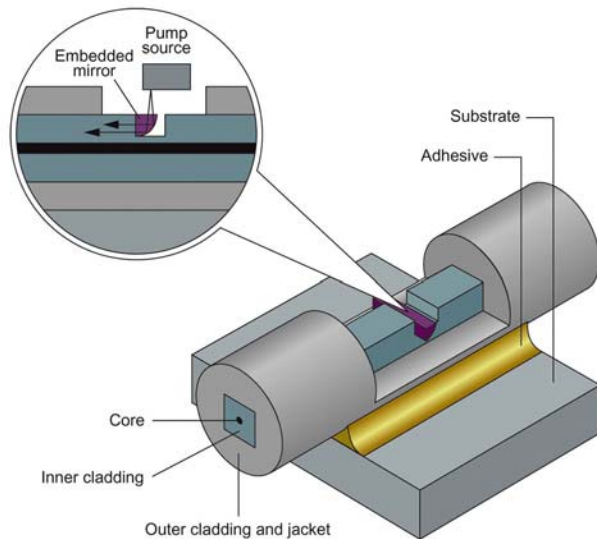


Using an Embedded Mirror to Couple Light into Cladding-pumped Fiber Sources



By embedding a mirror with high reflectivity coating on one side into a notch in the outer coating of an optical fiber and side-pumping light into the notch (left), NRL researchers have achieved (right) very high coupling efficiency (80% for a fiber array, 85% to 90% for a single fiber)

DESCRIPTION:

The technique of side-pumping light into optical fiber is not new, but the previously used V-groove technique was unstable, sensitive, and expensive. Naval Research Laboratory researchers have devised a side-pumping technique that is robust, highly efficient, and inexpensive. Light is side-pumped into a mirror that has been embedded in a groove in the outer coating of the fiber. This enables production of high-power fiber amplifiers. Without intervening optics between the diode or other pump source and the fiber, light is coupled very quickly and efficiently.

ADVANTAGES/FEATURES:

- The technique is easy and inexpensive to implement since diode arrays can be used for the side-pumping
- High coupling efficiency between the gain fiber and standard telecom fiber
- It is compatible with small amplifier packaging
- Both ends of the fiber are left unencumbered for maximum flexibility
- The gain fiber designs are not complex
- The location of the side pump can be tailored for a variety of applications
- Licensable under patent US 6,704,479

APPLICATIONS:

- Telecommunications
- Open-beam laser communications
- Laser processing
- High-energy laser pulses for weapons systems
- Medical applications (e.g., less invasive surgery)
- Factory processes (e.g., automotive welding, cutting, and drilling)

CONTACT:

Licensing information:

Jane F. Kuhl • Head, Technology Transfer Office • (202) 767-3083 • kuhl@utopia.nrl.navy.mil

Technical information:

James H. Cole • Optical Sciences Division • (202) 404-4203 • jazzcole@ccsalph3.nrl.navy.mil